

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~striketrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please AMEND claims 9, 11-13, and 19 and ADD new claims 30-33 in accordance with the following:

1.- 8. (CANCELLED)

9. (CURRENTLY AMENDED) A service brokering method for providing a complex service integrating a plurality of elementary services realized on a system which comprises a user software agent computer used by a user agent, a brokering software agent computer used by a brokering agent connected to the user software agent computer via a network and providing a complex service integrating a plurality of elementary services realized on a computer to the user agent, and a plurality of elementary service agents connected by a computer to the brokering software agent computer via a network and each of the plurality of elementary service agents providing an own elementary service realized on its own computer and provided independently from each other, the method comprising:

storing, by the brokering agent, for each elementary service, service description information comprising:

a combination of identification information of an elementary service agent which provides the elementary service, declarative description information on information needed to realize the elementary services, and declarative description information on the processing results of the elementary services,

the declarative description information comprising:

a declarative description, and

a statement of properties of an object of description;

upon receipt of a request message for the complex service from the user agent, decomposing the complex service into the elementary services using the service description information, by the brokering agent, and generating a service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and identification information of the elementary service agent which provides the

elementary service; and

requesting elementary services to the plurality of the elementary service agents based on the generated request plan by the brokering agent, and compiling the processing results so that the processing results of the complex service are prepared and notified to the requesting user agent,

wherein upon one of the plurality of the elementary service agents having a communications format different than other of the plurality of the elementary service agents converting data that is input to, and output from, the one of the plurality of the elementary service agents so as to allow use of a uniform input/output interface,

wherein the brokering agent checks a qualification of an elementary service agent before the storing of service description information for the elementary service agent, and

wherein the brokering agent generates the request plan which is taking into account meta-information describing the nature of the elementary service agent.

10. (CANCELED)

11. (CURRENTLY AMENDED) A computer readable storage medium recording a service brokering program for realizing a brokering agent providing a complex service integrating a plurality of elementary service on a computer, the brokering agent being connected to a user software agent computer used by a user agent, a brokering software agent computer used by a brokering agent connected to the user software agent computer via a network and providing a complex service integrating a plurality of elementary services realized on a computer to the user agent, and a plurality of elementary service agents connected by a computer to the brokering software agent computer via a network and each of the plurality of elementary service agents providing an own elementary service realized on its own computer and provided independently from each other, the program causing the computer of the brokering agent to execute:

receiving a request message for the complex service from the user agent; and

upon receipt of the request message, decomposing the complex service into the elementary services, by the brokering agent, using service description information comprising:

a combination of identification information of an elementary service agent which provides the elementary service,

declarative description information on information needed to realize the elementary services, and

declarative description information on the processing results of the elementary

services that are stored in advance for each elementary service, the declarative description information comprising:

a declarative description, and

a statement of properties of an object of description, and generating, by the brokering agent, an elementary service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and identification information of the elementary service entities; and

requesting elementary services to the plurality of the elementary service agents based on the generated request plan by the brokering agent, and compiling the processing results so that the processing results of the complex service are prepared and notified to the requesting user agent,

wherein upon one of the plurality of the elementary service agents having a communications format different than other of the plurality of the elementary service agents converting data that is input to, and output from, the one of the plurality of the elementary service agents so as to allow use of a uniform input/output interface,

wherein the brokering agent checks a qualification of an elementary service agent before storing of service description information for the elementary service agent, and

wherein the brokering agent generates the request plan which is taking into account meta-information describing the nature of the elementary service agent

12. (CURRENTLY AMENDED) A service integration system comprising:
a user software agent computer used by a user agent;
a brokering software agent computer used by a brokering agent connected to the user software agent computer via a network and providing a complex service integrating a plurality of elementary services realized on a computer to the user agent; and

a plurality of elementary service agents, connected to the brokering software agent computer via a network, and each of the plurality of elementary service agents providing an own elementary service realized on its own computer and provided independently of from each other,

the brokering software agent computer comprising:

means for storing service description information comprising a combination of identification information of an elementary service agent which provides the elementary service, declarative description information needed to realize the elementary services, and declarative description information on the processing results of the elementary services for each of the plurality of elementary services, the declarative description information comprising a declarative

description and a statement of properties of an object of description has,

means for transmitting and receiving messages, and

means for, upon receipt of a request message for the complex service from the user agent, decomposing the complex service into the elementary services using the service description information, by the brokering agent, and generating an elementary service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and the identification information of the elementary service agent which provides the elementary service, and

means for requesting elementary services to the plurality of the elementary service agents based on the generated request plan by the brokering agent, and compiling the processing results so that the processing results of the complex service are prepared and notified to the requesting user agent,

wherein upon one of the plurality of the elementary service agents having a communications format different than other of the plurality of the elementary service agents converting data that is input to, and output from, the one of the plurality of the elementary service agents so as to allow use of a uniform input/output interface,

wherein the brokering agent checks a qualification of an elementary service agent before the storing of service description information for the elementary service agent, and

wherein the brokering agent generates the request plan which is taking into account meta-information describing the nature of the elementary service agent

13. (CURRENTLY AMENDED) A service integration system comprising:

a user software agent computer used by a user agent;

a brokering software agent computer used by a brokering agent connected to the user software agent computer agent via a network and providing a complex service integrating a plurality of elementary services realized on a computer to the user agent; and,

a plurality of elementary service agents, connected to the brokering software agent computer via a network, and each of the plurality of elementary service agents providing an own elementary service realized on its own computer and provided independently from each other,

the brokering software agent computer comprising:

means for storing service description information comprising a combination of identification information of elementary service agent which provides the elementary service, declarative description information needed to realize the elementary services, and declarative description information on the processing results of the elementary services for each of the

plurality of elementary services, the declarative description information comprising a declarative description and a statement of properties the object of description has,

means for transmitting and receiving messages, and

means for, upon receipt of a request message for the complex service from the user agent, decomposing the complex service into the elementary services using the service description information, by the brokering agent, and generating an elementary service request plan comprising strings of combinations of at least elementary service request information needed to realize the complex service, and the identification information of the elementary service agent which provides the elementary service, and

means for notifying the generated request plan to the requesting user agent, the user agent comprising means for requesting elementary services to the elementary service agents based on the request plan generated by the brokering agent,

wherein upon one of the plurality of the elementary service agents having a communications format different than other of the plurality of the elementary service agents converting data that is input to, and output from, the one of the plurality of the elementary service agents so as to allow use of a uniform input/output interface,

wherein the brokering agent checks a qualification of an elementary service agent before the storing of service description information for the elementary service agent, and

wherein the brokering agent generates the request plan which is taking into account meta-information describing the nature of the elementary service agent.

14. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 12, wherein the brokering software agent computer transmits the request plan in response to a request for the request plan from the user agent.

15. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 12, wherein the brokering software agent computer further comprises means for receiving from the user agent service description information comprising a combination of identification information of the elementary service agent which provides the elementary service, declarative description information on information needed to realize the elementary service thereof, and declarative description information on the processing results of the elementary service, and means for storing the service description information into means for dynamically registering the service description information.

16. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 12, wherein the declarative description information on information needed to realize the elementary service and the declarative description information on the processing results of the elementary service are expressed by classes or objects of an object-oriented language.

17. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 12, wherein the brokering software agent computer further comprises ontology storing means for storing definition information on vocabularies used in the declarative description information on information needed to realize the elementary service and the declarative description information on the processing results of the elementary service.

18. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 17, wherein the means for decomposing decomposes the complex service into the plurality of elementary services using the service description information and the definition information stored in the ontology storing means.

19. (CURRENTLY AMENDED) A service integration system as set forth in claim 12, wherein the means for generating the elementary service request plan prepares the elementary service request plan taking into account meta-information ~~describing the nature of the elementary service agent which provides the elementary service itself~~, in addition to the declarative description information on information needed to realize the elementary service and the declarative description information on the processing results of the elementary information.

20. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 19, wherein the meta-information used for preparing the elementary service request plan is information on users' access rights to elementary services, information on the line speed or processing speed of elementary services, or information on the user preference of the elementary services.

21. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 12, wherein the brokering agent receives a reply message from any of the plurality of elementary service agents, judges whether generation of a new request plan is needed in accordance with the reply message, and generates a new request plan including a change in the previously generated request plan when generation of the new request plan is needed.

22. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 12, wherein each of the user software agent computer used by the user agent, the brokering software agent computer used by the brokering agent, and the plurality of elementary service agents connected by the computer is an interactive agent.

23. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 22, wherein each of the interactive agents use a frame-type data structure, and the frame is a data structure having a predetermined syntax including a slot name and slot value corresponding thereto in each line, and each of the frames is defined in advance for its service.

24. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 23, wherein the frame of the request message for the complex service is filled with their slot values.

25. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 23, wherein a plurality of frame pairs is stored as the service description information, and each of the plurality of frame pairs expresses a requirement and result of a service offered by each of the plurality of elementary service agents.

26. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 25, wherein the complex service is described in terms of the frames including the results of the service offered by the plurality of elementary service agents.

27. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 26, wherein the brokering agent generates the request plan based on the plurality of frame pairs and the complex service is described in terms of the frames.

28. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 27, wherein the request plan comprises strings of a plurality of elementary service requests, and each of the plurality of elementary service requests comprises a pair of a name of a requesting agent and a request message.

29. (PREVIOUSLY PRESENTED) A service integration system as set forth in claim 28, wherein the brokering agent sends a message to each of elementary service agents along

with the prepared request plan, assembles a frame based on a message returned as a reply, and returns the frame to the user agent.

30. (NEW) A service brokering method according to claim 9, wherein the brokering agent checks the qualification of the elementary service agent upon receipt of a registration request message from the elementary service agent.

31. (NEW) A computer readable storage medium recording a service brokering program service brokering method according to claim 11, wherein the brokering agent checks the qualification of the elementary service agent upon receipt of a registration request message from the elementary service agent.

31. (NEW) A service integration system according to claim 12, wherein the brokering agent checks the qualification of the elementary service agent upon receipt of a registration request message from the elementary service agent.

33. (NEW) A service integration system according to claim 13, wherein the brokering agent checks the qualification of the elementary service agent upon receipt of a registration request message from the elementary service agent.